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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/044,667 | 01/11/2002 | Brian C. Barnes | 2000.057000/TT4090 | 9420 |
| 23720 | 7590 | 03/15/2005 | EXAMINER | |
| WILLIAMS, MORGAN & AMERSON, P.C. 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042 | | | NGUYEN, VAN H | |
| | | | ART UNIT | PAPER NUMBER |
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DATE MAILED: 03/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/044,667

Applicant(s)

BARNES ET AL.

Examiner

VAN H NGUYEN

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This Office Action is in response to the application filed on January 11, 2002.
2. Claims 1-23 are presented for examination. Claims 1, 8, 12, 13, and 17 are independent claims.
3. It is noted that applicant has other related application (s), such as copending application No. 09/999,881 filed on October 31, 2001. It is requested that any related application be referred to in the first sentence of the specification.
Applicant is also requested to supply the serial numbers of any other related applications currently pending before the U.S Patent & Trademark Office.
4. Figure 1 should be labeled as "prior art" since its details are described in the Background of the Invention.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
6. Claims 1-7, 12, and 17-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
 - A. The following terms lack antecedent basis:

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- (i) "said security levels" (claim 1, lines 4-5; claim 12, lines 4-5; and claim 17, lines 5-6)
- (ii) "said function" (claim 1, line 6; claim 12, line 6; and claim 17, line 7)
- (iii) "said multi-level table access" (claim 4, line 7 and claim 20, line 8)

B. The claim languages in the following claims are indefinite.

- (i) "a segment" (claim 6, line 6 and claim 22, line 8)
- (ii) "a virtual memory address" (claim 6, line 10 and claim 22, line 12)

7. Dependent claims 2-7 and 18-23 are rejected for fully incorporating the deficiencies of their base claims.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).
9. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

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10. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).
11. Claim 1 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 09/999,881. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are both claiming *a method, comprising: executing a software object; establishing a security level for said software object; performing memory access using at least one of said security levels; and executing said function of said object*. The only difference between the instant application and the copending application is the instant application performs *a virtual address based* memory access and the copending application performs *a multi-table* memory access. It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace *a multi-table* memory access in the copending application for *a virtual address based* memory access in the instant application since a virtual address is in a multi-table - specifically, in virtual memory access table- and is used to locate the desired physical memory for executing the function of the software object.
12. As to the remaining claims 2-23, they are also rejected under obviousness-type double patenting rejection as stated in claim 1 above.
13. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

15. Claims 1-4, 6-20, 22, and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by **McKee** (US 6,745,307 B2).

16. **As to claim 1:**

McKee teaches the invention as claimed including a method (*e.g., method and system for controlling areas of memory within a computer to routines executing at a specific privilege level; see the abstract*), comprising:

- a. executing a software object (*e.g., executing process; col.8, lines 1-5 and col.13, lines 10-13*);
- b. establishing a security level for said software object (*e.g., specifies the privilege level required of an accessing process; col.8, lines 9-13*);
- c. performing a virtual address based memory access (*e.g., If an entry in the TLB can be found that contains the region identifier contained within the region register specified by the region register selector field of the virtual*

memory address, and that contains the virtual page address specified within the virtual memory address, then the processor determines whether the virtual memory page described by the virtual memory address can be accessed by the currently executing process; col.7, line 62-col.8, line 2)
using at least one of said security levels (e.g., *privilege levels 0, 1, 2, 3, and 4; see fig. 7 and the associated text in col. 9, lines 6-35*); and

- d. executing said function of said object based upon said virtual address based memory access (e.g., *the currently executing process may access the memory page if the access rights within the TLB entry allow the memory page to be accessed by the currently executing process and if the protection key within the TLB entry can be found within the protection-key registers 534 in association with an access mode that allows the currently executing process access to the memory page; col.8, lines 2-8*).

17. **As to claim 2:**

McKee teaches using a processor (e.g., *the processor; col.7, lines 66-67*) to process software code of said software object.

18. **As to claim 3:**

McKee teaches assigning a security level relating to a memory access of at least a portion of a memory (e.g., *memory access is provided only to routines running at those privilege levels at which a particular region of memory is intended for access; col.13, lines 6-8*).

19. **As to claim 4:**

McKee teaches:

- a. establishing a secondary table (*e.g., TLB 514; fig.5*);
 - b. receiving a memory access request based upon executing of said software object (*e.g., the application routine makes a system call which promotes 812 privilege level to privilege level 0; col.9, lines 43-44*);
 - c. performing said virtual address memory access based upon said memory access request using said secondary table (*e.g., the TLB can be searched for an entry containing a region identifier and virtual memory address that match the region identifier contained in the selected region register 516 and the virtual page address 505; col.7, lines 52-61*) and at least one virtual memory table (*e.g., the virtual page table 602; fig. 6*); and
 - d. accessing a portion of a memory based upon said multi-level table access (*e.g., access the memory page; col.8, line 3 and lines 17-23*).
20. **As to claim 6:**
- McKee teaches:
- a. determining at least one security level that corresponds to a segment in said secondary table (*e.g., see fig. 7 and the associated text*);
 - b. verifying a match between an execution security level to a security level associated with a segment being accessed in response to an execution of said object (*e.g., col.8, lines 25-45*),
 - c. determining a virtual memory address based upon said secondary table in response to a match between said execution security level and said security level associated with said segment being accessed (*col.8, lines 25-45*); and

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- d. locating a physical memory location corresponding to a virtual memory address (*e.g., find a memory page in physical memory corresponding to a virtual memory address; col.8, lines 47-48*).

21. **As to claim 7:**

McKee teaches:

- a. determining a physical address from said virtual memory table (*e.g., the virtual page table 602 includes a bit field 612 indicating whether or not the physical address is valid; col.8, lines 60-62*);
- b. determining a segment being executed based upon said physical address (*e.g., selects a memory page within physical memory; col.8, lines 62-66*);
and
- c. defining a current security level (*e.g., the current privilege level; col.9, lines 36-67*), based upon said determining of said segment being executed.

22. **As to claim 12:**

Note the rejection of claim 1 above. Claim 12 is the same as claim 1, except claim 12 is an apparatus claim and claim 1 is a method claim.

23. **As to claims 17-20, 22, and 23:**

Note the rejection of claims 1-4, 6, and 7, respectively. Claims 17-20, 22, and 23 are the same as claims 1-4, 6, and 7, except claims 17-20, 22, and 23 are computer readable claims and claims 1-4, 6, and 7 are method claims.

24. **As to claim 13:**

The rejection of claim 1 above is incorporated herein in full. Additionally, McKee further teaches a processor (*e.g., processor 108; fig. 1*), a bus (*e.g.,*

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internal bus 116; col.1, lines 41-42), a memory unit (e.g., memory 110, 112, 114; fig. 1), and a memory access interface (e.g., internal bus 117; fig. 1).

25. As to claim 14:

McKee teaches said processor comprises at least one microprocessor (*e.g., microprocessors 124-129; fig. 1*).

26. As to claim 15:

McKee teaches a virtual memory access table (*e.g., the virtual memory table 602; col.8, line 64*) coupled with a secondary table (*e.g., TLB 514; fig.5*), said memory access interface to provide a virtual memory addressing scheme (*e.g., the virtual memory page described by the virtual memory address; col.7, line 67- col.8, line 1*) to access at least one portion of said memory unit based upon a security level (*e.g., memory access is provided only to routines running at those privilege levels at which a particular region of memory is intended for access; col.13, lines 6-8*).

27. As to claim 16:

McKee teaches said memory unit comprises, among other things, a random access memory (*e.g., disks; col.7, lines 30-31*).

28. As to claim 8:

The rejection of claim 1 above is incorporated herein in full. Additionally, McKee further teaches:

- a. establishing a secondary table (*e.g., TLB 514; fig.5*)

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- b. receiving a memory access request based upon said executing of said software object (*e.g., the application routine makes a system call which promotes 812 privilege level to privilege level 0; col.9, lines 43-44*);
- c. determining at least one security level (*e.g., specifies the privilege; col.9, lines 13-14 and fig.7*) that corresponds to a segment (*e.g., a memory page; col.9, lines 13-14 and fig.7*) based upon a virtual address (*e.g., virtual page address; col.8, lines 47-54*); and
- d. accessing a portion of a memory based upon said security level and said virtual address (*e.g., access the memory page; col.8, lines 1-24*).

29. **As to claims 9-11:**

They include the same limitations as claims 2, 3, and 7, respectively, and are similarly rejected under the same rationale.

Allowable Subject Matter

30. Claims 5 and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- (i) Barnes et al. (US 6823433) teaches "Memory management system and method for providing physical address based memory access security."
- (ii) Maruyama (US 6052763) teaches "Multiprocessor system memory unit with split bus and method for controlling access to the memory unit."
- (iii) Johnson et al. (US 5684948) teaches "Memory management circuit which provides simulated privilege levels."
- (iv) Clifton (US 5469556) teaches "Resource access security system for controlling access to resources of a data processing system."
- (v) Nolan, Jr. (US 5146575) teaches "Implementing privilege on microprocessor systems for use in software asset protection."
- (vi) Mahon et al. (US 4809160) teaches "Privilege level checking instruction for implementing a secure hierarchical computer system."
- (v) Gilmont et al. "Enhancing security in the memory management unit" 1999 IEEE, pp. 1-8.
- (vi) Ozaki et al. "Software fault tolerance in architectures with hierarchical protection levels " 1988 IEEE, pp. 30-43.

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to VAN H. NGUYEN whose telephone number is (571) 272-3765. The examiner can normally be reached on Monday-Thursday from 8:30AM - 6:00PM. The examiner can also be reached on alternative Friday.

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33. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756.
34. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.
35. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any response to this action should be mailed to:
Commissioner for patents
P O Box 1450
Alexandria, VA 22313-1450



Van H. Nguyen